

Claims

- [c1] 1.A transverse gradient coil comprising:
a strip of electrically conductive material; and
said strip of electrically conductive material having a
hollow portion such that fluid is permitted to flow
through the conductive material.
- [c2] 2.The transverse gradient coil assembly of claim 1
wherein the hollow conductor is wound in a helix to form
the general shape of a cylinder.
- [c3] 3.The transverse gradient coil assembly of claim 2
wherein the hollow conductor is wound for use in a
shielded gradient coil.
- [c4] 4.The transverse gradient coil assembly of claim 3
wherein the gradient coil is comprised of a plurality of
hollow conductor sections, each permitting fluid to flow
through the conductor.
- [c5] 5.The transverse gradient coil assembly of claim 4
wherein the hollow conductor is wound for use in a flat
gradient coil, for use in an open architecture Magnetic
Resonance Imaging device.

- [c6] 6.The transverse gradient coil assembly of claim 5 wherein additional cooling is provided by a plurality of coolant pipes situated in thermal contact around the gradient coil.
- [c7] 7.The transverse gradient coil assembly of claim 6 wherein the coolant passed through the tubular area is water, ethylene glycol or a mixture of the two coolants.
- [c8] 8.An MRI apparatus comprising:
a magnetic resonance imaging system (MRI) having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse mode to transmit RF signals to an RF coil assembly to acquire MR images;
an input device to select a scan sequence; and
wherein a gradient coil is wound of a hollow conductor elements such that fluid is permitted to flow through the conductor.
- [c9] 9.The MRI apparatus of claim 8 wherein the hollow conductor is wound to comprise a transverse gradient coil.
- [c10] 10.The MRI apparatus of claim 9 wherein the hollow conductor is wound for use in a shielded gradient coil assembly.

- [c11] 11.The MRI apparatus of claim 10 wherein the gradient coil is comprised of a plurality of hollow conductor sections, each permitting fluid to flow through the conductor.
- [c12] 12.The MRI apparatus of claim 11 wherein the hollow conductor is wound for use in a flat gradient coil, for use in an open architecture Magnetic Resonance Imaging device.
- [c13] 13.The MRI apparatus of claim 12 wherein additional cooling is provided by a plurality of coolant pipes situated in thermal contact around the gradient coil.
- [c14] 14.The MRI apparatus of claim 13 wherein the coolant passed through the tubular area is water, ethylene glycol, or a mixture of the two coolants.
- [c15] 15.A gradient coil assembly comprising:
a strip of conductive material;
said strip of conductive material being formed into a cylindrical coil winding;
said winding including a continuous tubular hollow area through the winding, said hollow area permitting the continuous flow of coolant.
- [c16] 16.The gradient coil assembly of claim 15 wherein the

gradient coil is used for a shielded gradient coil assembly.

- [c17] 17.The gradient coil assembly of claim 16 wherein the gradient coil is comprised of a plurality of hollow conductor sections, each permitting fluid to flow through the conductor.
- [c18] 18.The gradient coil assembly of claim 17 wherein additional cooling is provided by a plurality of coolant pipes situated in thermal contact around the hollow gradient coil.
- [c19] 19.The gradient coil assembly of claim 18 wherein the coolant passed through the tubular area is water, ethylene glycol, or a mixture of the two coolants.
- [c20] 20.A transverse gradient coil assembly comprising:
 - a cylindrical inner coil winding, said winding further including a continuous tubular hollow area through the winding, said tubular area permitting the continuous flow of coolant;
 - a filler material surrounding the coil winding; and
 - a plurality of coolant pipes situated in thermal contact with the gradient coil in the filler material.
- [c21] 21.The transverse gradient coil assembly of claim 18 wherein the gradient coil is comprised of a plurality of

hollow conductor sections, each permitting fluid to flow through the hollow conductor.

[c22] 22.A method for cooling a gradient coil assembly comprising the steps of:

providing a conductor having a continuous hollow center;

winding the conductor into a spiral such that said conductor forms a cylinder;

providing a cooling system for circulating a coolant through the hollow area in the inner gradient coil.

[c23] 23.The method of claim 22 further comprising the step of locating the wound cylindrical conductor in coaxial relationship with other cylindrical windings.

[c24] 24.The method of claim 23 further comprising the step of positioning said gradient coil windings in a radially spaced-apart coaxial relationship.

[c25] 25.The method of claim 24 further comprising the step of circulating coolant through said gradient coil windings.